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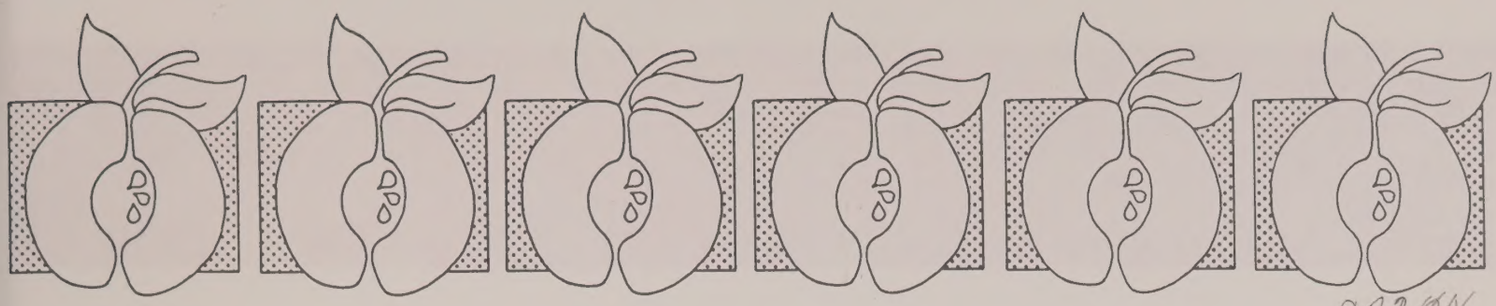
Hon. Keith C. Norton, Q.C., Minister
George R. Podrebarac, Deputy Minister

Support Document
to the Formative Years

1985

Shared Discovery:
Teaching and Learning in the Primary Years



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It should be noted that the position given for each person is that held by him or her at the time of participation in the development of this document.

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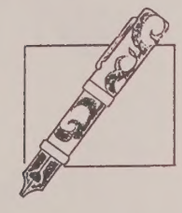


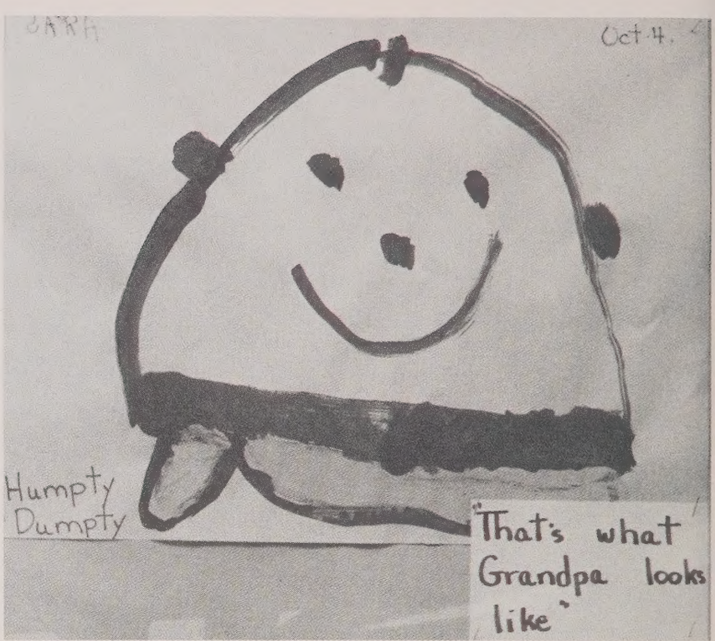
Introduction

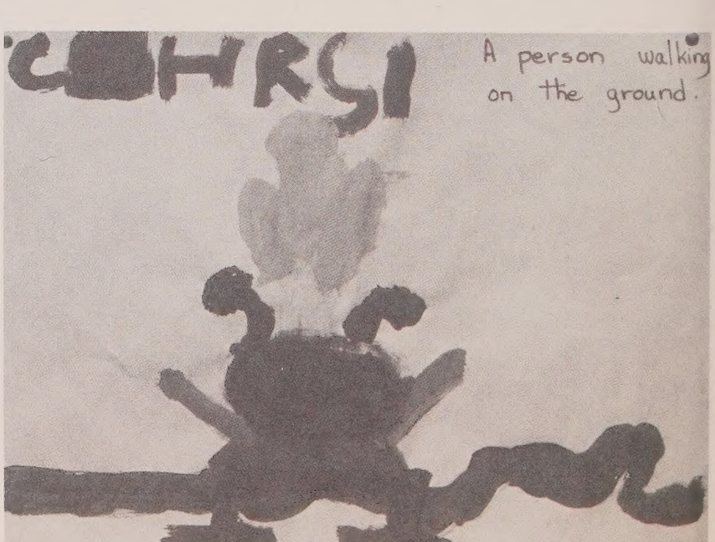
One of the main responsibilities of teachers is to help children to become effective problem-solvers and sensitive decision-makers. To accomplish this, teachers must provide pupils with a secure, stimulating environment that will support and encourage the growth of self-confident, creative individuals who are capable of making and being responsible for their own decisions, both now and in the future. Through a climate that provides them with both acceptance and challenges, children will be able to acquire the knowledge, skills, and attitudes that they require to continue to learn in a satisfying way.

This resource guide is designed to assist Primary teachers to:

- observe children in a learning environment that supports inquiry learning; and
- use the information gained through their observation to design and implement programs that extend and develop the inquiry process in children.

It provides a philosophical and theoretical framework, as well as practical examples, for observing children throughout the Primary years and for planning appropriate programs for them.





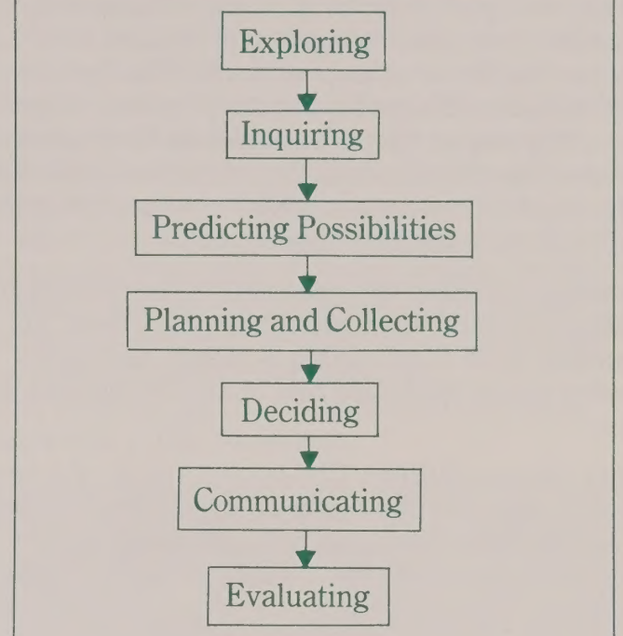
Children need to participate in learning activities in which the level of difficulty gradually increases as their abilities grow. They require many experiences with real materials and events before working with representations of these in pictures and symbolic or abstract (e.g., print) materials. However, while familiar materials and events are easier for children to think about, they need to meet the challenge of unfamiliar things from time to time as their abilities grow. When such unfamiliar objects or ideas are first introduced into a child's learning activities, their number should be limited. Gradually, the number of new objects or ideas introduced at one time may be increased in keeping with the level of the child's understanding.

Learning Through Inquiry

Children arrive in school with open, inquiring minds. They are already familiar with the inquiry process through their experiences with play, and their most important need in the Primary years is to have opportunities to continue their natural inclination towards inquiry learning. In this regard, their ability to make and be responsible for their own learning decisions will ensure both their growth and their refinement of the inquiry process.

The accompanying diagram presents the seven main stages of the inquiry process. The descriptions of these stages, which follow the diagram, are based on a child's play with blocks and indicate how the inquiry process occurs naturally in children.

General Inquiry Process



Exploring. Children learn by exploring materials and events through the use of all of their senses. For example, when children build with blocks, they observe the characteristics of the blocks. As they select different blocks for various purposes, they classify by colour, shape, and size. As they introduce patterns into their models, they separate blocks by differences. When they match blocks that fit together, they learn to make correspondences.

Inquiring. Children ask questions of themselves and of others to clarify an issue or pose a problem. For example, while constructing a garage, they may wonder which blocks are best suited for building a ramp.

Predicting possibilities. Children can think of a range of reasonable possibilities to answer a question or solve a problem. For example, in building a ramp, they select a variety of possible shapes that might be suitable.

Planning and collecting. Children collect information about each predicted possibility. Thus, in making the ramp, they will try each different block shape until they discover the shape that works.

Deciding. Children arrive at a conclusion by deciding, on the basis of the information they have gathered, which possibility provides the best answer to the question or solution to the problem. When they discover a type of block that works, the children decide to use that type for the ramp.

Communicating. Children choose the best way to present their findings. In the case of the ramp, they may show other children how a vehicle's wheels will ascend and descend the ramp.

Evaluating. Children check whether their decision was correct. Thus, if the ramp works well, the children know that they have made the right decision.

Developmental Learning (Growth Strands)

Children's learning is developmental. They acquire knowledge, skills, and attitudes gradually, based on their unique experiences. However, when the behaviour of many Primary children is observed over time in a specific learning area, a general pattern of development appears. When this pattern is organized into a progression of identifiable steps, it reveals the developmental growth of children in the particular sphere of learning under observation. This hierarchical organization is known as a *growth strand.* At any given time, the individual children within a class may have reached different points on any one growth strand.

Some growth stands (e.g., those for reading and writing) are made up of very broad steps, while others (e.g., those for observation and classification skills) are composed of finer steps. Over time, educators will be able to identify and define additional growth strands and will be able to refine the steps in the growth strands that already exist. Clearly defined growth strands are indispensable to teachers, as they observe children and plan for their growth and development. Examples of growth strands for pupil growth and development of independent inquiry strategies, as well as of writing, reading, thinking (observation, classification, seriation, correspondence), and social skills are included in the appendix to this document.

The Teaching Process

Teachers make many decisions as they work with Primary children. These decisions make up a process that consists of four stages: observing, interpreting the observations, planning and implementing individualized programs, and evaluating.

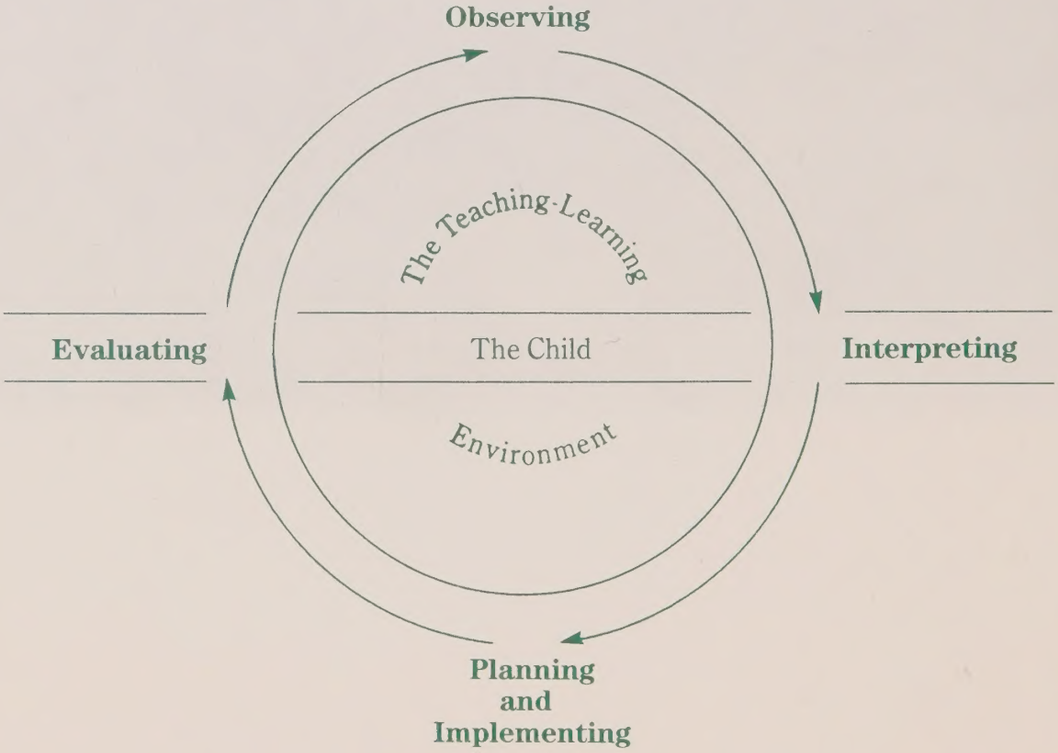
Observing involves the early and continuous assessment of a child's knowledge, cognitive skills, psychomotor skills, and affective development. These observations must then be interpreted so that an appropriate program can be planned and implemented for each child. Program objectives are established in the planning stage, and these are then incorporated into the design of the learning environment that suits the individual needs of the pupils. Each child's progress is evaluated, and, with this round of observations and assessments, the teaching process continues.

As teachers use this process of observing, interpreting their observations, planning and implementing programs, and evaluating, they are following an inquiry process:

- They are *exploring* when they relate their knowledge of the general characteristics and learning needs of Primary children to their specific observations of the progress of individual children in the four areas of learning – knowledge, cognitive skills, psychomotor skills, and affective development.
- They are *inquiring* when they consider the information gained through this exploration in determining which objectives to set for each child's growth in the four areas of learning.
- They are *predicting possibilities* when they suggest a range of objectives related to growth in each of the four areas.
- They are *planning and collecting* when they design activities and alter the learning environment to implement the objectives.
- They are *deciding* when they observe the children engaged in the activities in order to evaluate their progress.
- They are *communicating* when they share their assessment of the child's progress with the child, his/her parents, and other educators.
- They are *evaluating* when they consider the effectiveness of their use of the inquiry process in helping children to become more responsible for their own learning.

Thus, the inquiry process is used by teachers in their instructional decision making in much the same way as it is used by children in making decisions as part of their learning.

The Teaching-Learning Process



Observing

Early and ongoing observation is not a separate program. It is an integral part of the teaching process, which continues throughout a child's school life. The teacher's observation of the child can begin in the home environment or in an inviting, reassuring area of the school. Observations should be made of the child's interaction with people and things in the environment and the child's attitudes and learnings. In this way, the teacher will discover the special talents, strengths, interests, and needs of the child that may affect his/her progress towards becoming an autonomous learner. A more in-depth identification of needs may be made with the help of other professionals. Whenever possible, however, appropriate program modifications and the participation of support personnel should take place within the classroom environment.

A teacher's own observations of the child can take place in the home, school, classroom, school playground, or neighbourhood. The child can be observed before, during, and after school; working alone or in a group situation; interacting with peers, older children, teachers, or other adults; manipulating

Parents are an important source of information regarding the interests, strengths, and needs of their children. Parent-teacher interviews can take place either in the child's home or in the school building. Day-care personnel and/or community workers may also contribute valuable insights into the child's preschool experiences. School and health records, which reflect changes and growth in the child's development, constitute still another important source of information for the teacher. These include the child's registration form, public-health records, Ontario School Record (OSR), and any records or reports of external community agencies or services.

a variety of concrete, pictorial, or symbolic/abstract materials; and carrying out routines such as planning activities or tidying up. In any of these contexts, the teacher can watch, listen to, and note what the child does or says in different situations; interact with the child and at times note precisely what the child has said or done; and examine and record analyses of the child's products.

Pupil observation may be planned in a number of ways:

- One child may be observed for a particular purpose in a particular situation at least once during a week. The same child may be observed in another situation for a different purpose in the following week.
- Two children may be observed for a day.
- One child may be observed at regular intervals of time (e.g., every ten minutes) over a period of time (e.g., one hour).
- A child may be observed in the context of a shared-interest activity.
- A child's behaviour may be observed at the same time each day over a period of time (time sampling).

Teachers may devise their own methods for recording their observations of children. It is important, however, that teacher observations be systematic, ongoing, and retained in a recorded form. Over time, these records will reveal patterns of behaviour that will allow successive teachers to adapt their programs to suit the child's specific needs.

Interpreting the Observations

While teachers' observations of children tend to be general at first, they become more precise as they observe their pupils in various contexts. In order to interpret these observations fully, teachers need to know which questions to ask. The following are some general questions related to the four areas of learning – knowledge, cognitive skills, psychomotor skills, and affective development. Questions such as these will help teachers to organize their observations and to detect patterns and relationships. Through this approach, teachers will be able to construct a picture of the whole child and to make generalizations that can be used in all parts of the curriculum.

Knowledge (Facts, Concepts, Generalizations)

- With what aspects of objects or events is the child familiar?
- What concepts does the child understand?
- What concepts is the child beginning to relate in order to form generalizations?

Cognitive Skills (Thinking, Procedural, and Inquiry Skills)

- What characteristics of objects and events is the child perceiving through his/her senses?
- At what level of complexity are the child's skills of classifying, seriating, and corresponding?
- In what ways does the child use language? (e.g., reporting, projecting, predicting)
- What skills does the child have in measuring and graphing?
- What kinds of information are the child's questions seeking? (e.g., factual, answer to a problem)
- How often are the child's predictions relevant to the question?
- Can the child use or suggest appropriate ways to organize information? Which ways are used most often?
- What kind of information sources is the child able to use?
- Can the child make a decision based on the information obtained? How is this accomplished?
- What methods of communication does the child use?
- Is the child able to evaluate his/her inquiry process in co-operation with the teacher?

Psychomotor Skills (Gross and Fine)

- How well can the child use his/her large muscles in terms of his/her stage of development?
- Is the child able to use his/her small muscles in ways commensurate with his/her stage of development?

Affective Development (Likes and Dislikes, Interests, Attitudes, Values)

- How does the child show curiosity about objects and events?
- Does the child sustain any interest in objects or events?
- Does the child have a positive attitude towards following through on an activity?
- Does the child take responsibility for some of the work when involved in a group activity?

Planning and Implementing Individualized Programs

Planning involves setting program objectives based on interpretations of observations of the child and a knowledge of developmental growth (growth strands) and of how learning takes place. In planning an individualized program, the teacher will have to answer the following question: "What knowledge, cognitive-skill, affective-development, and psychomotor-skill objectives should I set for the child?" The teacher should also involve the child in the planning of his/her learning activities.

At times during the observation of a child, the teacher may be able to plan appropriate learning opportunities that will immediately extend the child's learning. In other cases, the teacher may require time to develop further plans. In either case, the learning decided on should be integrated into the day-to-day experiences of the child.

Sample Record

Name	Time, Date, Context	Observations	Interpretations	Follow-up Plans

If the teacher is familiar with the stages of the general inquiry process, he/she will be able to recognize the specific stage reached by a child and to know when and how to interact with the child to help that child extend his/her inquiry skills. The following chart illustrates how this might take place in the classroom:

Exploring	Inquiring	Predicting Possibilities	Planning and Collecting	Deciding	Communicating	Evaluating
Three children are filling and emptying containers of water at the water table. *Peggy* "My jar has the most water. I'll bet it's the heaviest jar of water." *Tim* "My jar is heavy too. It's fatter than yours, Peggy. I think it weighs more too." *Tony* "My jar is the tallest. It must weigh more."	*Teacher* "What are you wondering about?" *Tim* "Which jar is the heaviest when it is full of water?" *Teacher* "How can you find out?"	*Tony* "We could fill each jar with water and then lift one at a time." *Peggy* "I know. We could use the balance scale from the cupboard." *Tim* "Let's try lifting first."	*Teacher* "How can you keep a record of what you find out?" *Peggy* "We'll make a picture of each jar, and we'll each put our name under the jar we think is the heaviest." *Tim* "Then we can weigh them to see which is the heaviest." The three children take turns holding each of the three jars full of water in order to predict which one is the heaviest. Each child records his/her name under a chosen jar. (The difference in mass is not great enough to be observed by holding.)	Peggy brings the scale from the cupboard, and the children check the mass of each jar against that of each of the other two. (Peggy's jar has the greatest mass.)	The children decide to colour the picture of the jar that is the heaviest when filled with water.	*Teacher* "What did you find out today?" *Tony* "If you can't find out by lifting, you should use a scale to find out which thing is heaviest."

Once program objectives have been decided, the learning environment must be modified as required. Changes may be made in the materials provided, the organization of time and space, or the people involved. An alteration in the level of difficulty of the activities in which the child is involved may also be required. For example, a child who has worked successfully with familiar objects (e.g., pouring water into and out of such containers as soap bottles and milk cartons) may be ready to work with unfamiliar objects (e.g., pouring water into and out of graduated metric containers). Similarly, a child who has worked successfully with concrete objects may choose to record some aspect of his/her activity in an abstract form (e.g., a picture or graph). Alternatively, the level of difficulty can be adjusted by increasing or decreasing the number of ideas or materials to which the child is exposed. Individualized learning depends to a great extent on the teacher's ability to match difficulty levels to the unique abilities of each child.

Evaluating

Evaluating involves a continuous appraisal of a child's growth in knowledge, cognitive skills, psychomotor skills, and affective development, requiring co-operation on the part of the teacher, the child, and the parents. To evaluate a child's progress, the teacher will have to answer the following question: "How can I evaluate the child's progress in order to be able to provide further programming for growth?"

The evaluation stage involves the observation of the child in a variety of activities to determine how well the learning objectives are being met. Once this has been determined, the teacher can consult the appropriate growth strand to plan further objectives to extend the child's learning. For example, if a child can classify a collection (e.g., of food) according to a very noticeable characteristic (e.g., colour, size, shape), the child may then be asked to classify the collection according to a less noticeable characteristic (e.g., texture, odour). This process provides the teacher with precise information that can also be used to inform parents and administrators about the child's growth and development.

The evaluation stage completes the cyclical teaching process. The observations made as part of the evaluation process must be interpreted, and on the basis of these conclusions, further program modifications can be planned and implemented. These in turn will then be evaluated.

Making a Start

While there is no one right way to change an existing program, it is possible to focus on certain aspects of the teaching process as a way of getting started. This part of the document offers some suggestions in three different areas:

- observing one child in depth;
- planning a shared-interest learning activity; and
- establishing an environment that is conducive to individualized learning.

Observing One Child in Depth

The suggestions made under "Observing" in the preceding part of this document outlined some of the possible sources of information available to teachers, as well as some basic guidelines for observing children. This section takes a more detailed look at the process through an examination of a case study. The child in this example is a Kindergarten pupil named Tracy.

The teacher began by obtaining information on Tracy's family and other personal data from her school-registration card. This was followed by a home visit, during which Tracy's parents informed the teacher about Tracy's preschool experiences (i.e., nursery school and Tracy's participation in swimming and ballet) and outlined their perception of her language development, strengths, and interests. Although the teacher had brought along some models, pictures, and books about zoo animals to stimulate conversation with Tracy, the child ignored them, choosing instead to pursue her own topics of interest. The teacher made the following record of this conversation with Tracy.

Observing	Interpreting	Planning and Implementing
Tracy talked about her grandmother, aunts, and uncles.	*Knowledge* She has a healthy understanding of family relationships and structure.	Can Tracy begin to develop an understanding of animal families? (Use models and pictures of farm animals in the classroom and a farm visit to pursue this topic.)
Tracy had gathered books and special toys to share in preparation for the conference. She chose to discuss these toys rather than the zoo animals brought for this purpose.	*Affective Development* Tracy may have felt more confident with familiar belongings.	When Tracy feels more secure with the teacher will she pursue a topic introduced at school? (Will she be interested in farm animals?)
She recognized some numerals. She named some letters of the alphabet.	*Cognitive Skills* She has good recognition of, and can orally label, familiar symbols.	Can she match numerals to sets? (When she classifies objects at school, have numerals available.) Will she use the letters of the alphabet in some correct positions if she chooses to write creative stories at school?
She handled crayons and a pencil comfortably. She made a detailed picture.	*Psychomotor Skills* Her fine-motor skill development is very good.	Are Tracy's gross-motor skills well developed? (Observe her movements at school – in the classroom, gym, playground.)
She uses such words as *tight, stitches, teasing, hugging,* and *chasing* in conversation.	*Cognitive Skills* She uses a broad range of words in conversation.	Can Tracy retell stories or tell her own creative stories using a broad choice of words? (Listen to Tracy in the classroom as she retells stories heard in school or at home or as she tells her own real or imagined experiences to a peer or an adult.

The teacher next observed Tracy in the classroom, as she worked at exploring and classifying photographs of animals and a set of model farm animals (cows, bulls, and calves of different breeds). The following chart is part of the teacher's record of these observations, interpretations, questions for planning, and suggestions for implementing.

The teacher continued to record her observations of Tracy in this way in various contexts (e.g., writing and reading activities) and situations (e.g., in social interaction with other students in both the classroom and the playground). In this way, a comprehensive bank of data was assembled on Tracy's knowledge, cognitive skills, psychomotor skills, and affective development (social skills). This was then used as the basis for planning an appropriate program for Tracy.

The teacher also involved the Primary and visual arts consultants in an assessment of Tracy's artwork. Together, the three educators determined the child's strengths and needs and then devised appropriate strategies based on their assessment.

Observing	**Interpreting**	**Planning and Implementing**
Tracy called a bull, with a ring in its nose, first a hog and then a cow.	*Knowledge* Initially, she was unsure of many appropriate labels. By asking questions of the observer, she quickly gained confidence and accuracy.	Can Tracy learn more appropriate labels for objects and situations? (Be available, as much as possible, to answer questions during the class visit to the farm and the follow-up activities.)
Tracy clustered Holstein calves with the mother cow. She then added the appropriate bull ("dad"..."bull") and called the group a "family".	*Cognitive Skills* As she gained information about characteristics, her ability to classify increased. This happened fairly spontaneously, with minor cuing used for reinforcement.	Can Tracy continue to refine her classification skills, with some cuing by the teacher, when using other concrete objects? (Note how Tracy classifies vehicles that are placed on the sand table.)
When discussing a story about the farm with her teacher, Tracy commented, "... The farmer had more than one problem; he didn't know where to put the other animals when he went to the doctor."	*Cognitive Skills* She can identify obvious problems in a story.	Can Tracy identify problems in her play at activity centres and during other activities? (Note whether Tracy can identify less obvious problems in stories.)
At the teacher's request, Tracy initiated a classification activity of number sets with another girl, Kathy.	*Affective Development* Tracy invited participation from Kathy and did not attempt to control the whole situation. She tried several approaches to include Kathy.	Will Tracy include other children in activities? (Observe Tracy's playhouse behaviour.)

Planning a Shared-Interest Learning Activity

A shared-interest learning activity is planned jointly by the teacher and the children. It should stimulate curiosity in the pupils and foster a spirit of inquiry. Before such an activity can be planned, the teacher should try to answer the following questions:

- What interests have the children shown?
- Are a sufficient quantity and diversity of materials available for students to use as sources of information for a range of activities?
- Where can the materials be located so that they are readily available to the children?
- How will the children's ideas and conclusions be expressed?

Together, the teacher and the children can then proceed to plan:

- the overall objective for the activity;
- the classroom arrangement of space and materials;
- a time frame for the activity;
- arrangements for managing the materials;
- procedures for maintaining records of what transpires;
- a system for evaluating the overall process and for deciding on modifications to the approach used.

A shared-interest activity may result from an interest that an individual child or group of children has in an activity or idea. When the teacher observes such an interest, he/she works with the pupils to plan any further learning activities that may be needed to clarify the problem, suggest alternative solutions, gather data, and arrive at and express conclusions. The teacher interacts with the group from time to time to provide support and guidance. The following example of the shared interest of a small group of older Primary children illustrates how the teacher can interact with a group within the context of a shared-interest activity.

The stimulus for the activity came from the group's observations of a pet that one of them had brought to school. As they cared for it, they discussed informally its characteristics and needs:

"This rabbit is so soft," Abbey said, as she put the rabbit back into its clean cage.

"See it nibbling at the lettuce," Enzo exclaimed. "It's hungry."

"Will it drink from the water dish?" Marie asked.

"Maybe we could let it out of its cage later for some exercise," Abbey suggested.

"Rabbits like carrots. I'll bring some for him," Enzo offered.

"We know how to care for a rabbit. I wish we had a pet to keep in our classroom all the time," Joe said.

The teacher made the following interpretations, based on observations of this conversation:

Knowledge	Cognitive Skills	Affective Development	Psychomotor Skills
The children - know the kind of animal; - know that it requires a clean cage; - know the food it eats; - know that it needs water and exercise; - know how it moves.	The children - observe the characteristics of the rabbit (e.g., soft fur, hops, eats lettuce and carrots); - classify the pet as a rabbit; - use the correct terminology to discuss the care and characteristics of the pet.	The children co-operate in, and take responsibility for, the care of the pet.	The children use fine-motor skills in handling the pet and supplying it with food and water.

After listening to the children's discussion about the rabbit and their wish to have a classroom pet, the teacher interacted with the group to discover whether this interest was shared by all of the group's members. On the basis of the shared interest of the small group of children, the teacher set as an overall objective "the application by the children of a problem-solving approach to choosing a classroom pet."

Through their discussion with the teacher, the children realized that they needed to conduct further exploratory activities to add to their information so that they could make a wise choice of a classroom pet.

The teacher's specific objectives for the shared-interest activity included providing the children with the following:

- experiences through which they could gain knowledge of other pets;
- opportunities to observe several characteristics of pets through the use of real animals, pictures, and stories;
- the correct terminology that they would need to discuss the characteristics of various pets;
- opportunities to classify animals into several different categories, using models and pictures, so that they would develop the concept of what would make a suitable pet;
- the skills needed to construct a cross-classification grid;
- opportunities to write appropriate words on a chart;
- the skills required to combine all of the pet concepts together so that they would understand the principle that all pets need care.

A pet centre containing many familiar and unfamiliar materials relating to pets was set up in the classroom. Some of the materials in the centre were concrete (e.g., models), others were pictorial (e.g., photos of both familiar and unfamiliar pets), and still others were abstract (e.g., books). Labels were made of pet names and characteristics, and organizers (e.g., hoops, boxes, charts) were provided. Many of the materials were brought in by the children, while others were added by the teacher.

Field trips were organized to such pet centres as pet shops and the Society for the Prevention of Cruelty to Animals. Visitors, such as a veterinarian and pet owners, were invited to talk to the pupils. Various pets were brought to class. The children were shown films and filmstrips dealing with pets. The children had many informal discussions about the pet materials at the centre and made observations about them. They used the resources in the room to make pictures and models of pets and to write stories as records of their observations. As the shared interest progressed, the children showed through their language, paintings, modelling, and writing that they had observed and remembered an ever-increasing number of physical, environmental, and behavioural characteristics of pets. They were beginning to build concepts related to a variety of pets, and they showed an understanding of the principle that all pets need care (i.e., food, water, exercise, and shelter).

During discussion, the teacher used cues such as the following to bring out the children's ideas:

- What are some kinds of things that we should observe about pets? (e.g., dominant characteristics such as colour, size, shape, sound, and movement)
- What are some other things that we might observe? (e.g., less dominant characteristics such as speed of movement, food, habitat, and body parts)

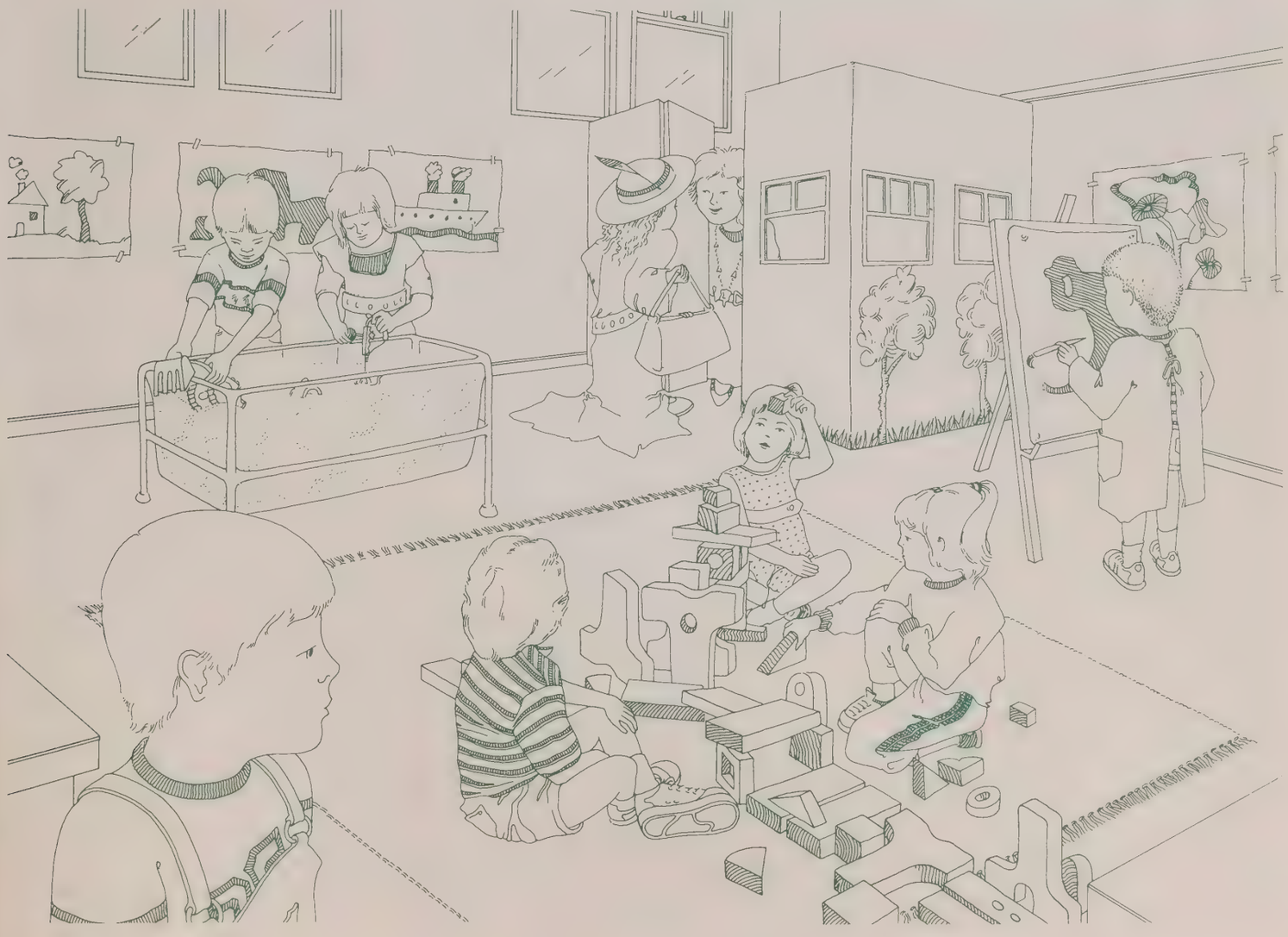
The teacher set up a classification centre containing an appropriate number of pictures, models, and ways of organizing the children's thinking about the materials (e.g., hoops, strings, pie plates). The children recorded their classifications by drawing pictures, labelling, and discussing their classifications. These children had previously used organizers to classify.

As is evident from this description, the children have become involved in exploratory activities. These may then form the basis for a full-blown inquiry along the lines suggested in the earlier section of this document entitled "Learning Through Inquiry".

Designing the Learning Environment

The primary learning environment—whether it be the classroom, school, playground, home, neighbourhood, or community—should be planned by the teacher, in co-operation with the child, in order to facilitate the child's interaction with peers, adults, and materials. The environment should be based on information gathered about the child. It should contain a wealth of motivating materials that will stimulate the child's curiosity and encourage the child to embrace new learning. It should be relaxed and safe and have many elements that the child is familiar with and has been accustomed to using. It should also allow the child to pursue his/her own interests and inquiries.

Tracy's Kindergarten classroom, for example, displays a flexible arrangement of furniture, materials, and equipment. The climber has been assembled and is used for various climbing activities, as a prop for an impromptu dramatic production and as bunkbeds in the home centre. The changes that are made in that area result directly from input from the children or as a result of the teacher's response to observed pupil needs. Many temporary and permanent centres are also used in the classroom. These house a range of materials and equipment that are easily accessible and are managed by the pupils themselves or by adults participating in the program. In addition, the room contains many objects from the real world, selected by both the teacher and the pupils themselves, that help to create a lively environment that invites questions and discovery.



The materials selected by Tracy's teacher indicate a conscious attempt to create an environment that will appeal to the natural curiosity and senses of the learners. For example, an old clock chimes each hour during the exploration. The housekeeping centre's drawers are crammed with various items whose colours, textures, and shapes evoke imaginative responses. The tools and surfaces at the writing centre are planned to encourage the children to investigate print symbols in a variety of ways.

Primary children display a broad range of growth in knowledge, cognitive skills, affective development, and psychomotor skills. As they grow in these areas, certain aspects of the environment should change to meet their developing intellectual, social, emotional, and physical needs. Teachers must understand these developmental characteristics of the young child in order to make appropriate decisions regarding the following components of the environment:

- selection of materials;
- arrangement of space;
- organization of time;
- involvement of people in the program.

Selecting materials. Children learn by having a wide scope of materials to which to respond. The teacher should ensure the availability of an abundance of high-quality concrete, pictorial, and symbolic/abstract materials in sufficient variety to meet the needs of each child. The materials should be changed as the interests or capabilities of the children develop.

Materials should be provided for investigative purposes. These can be used to stimulate the children's curiosity, to present new ways of thinking, and to promote problem-solving and inquiry skills. Children can also use them to develop thinking skills by observing, classifying, and seriating them. The following are some of the materials for these purposes

that can be available in the learning environment throughout the Primary Division:
- natural materials (e.g., clay, sand, water, bones, paints, shells, stones);
- living things (plants, animals); see *Science in the Primary and Junior Divisions,* Curriculum Ideas for Teachers, 1983, pp. 9-10;
- construction materials (e.g., large blocks, snap blocks);
- tools for observing and measuring (e.g., magnets, magnifying glasses, scales, tapes, containers, clocks);
- toys and utensils (e.g., dolls, dishes, vehicles, cooking utensils, small machines).

Materials that serve as sources of information should also be available, to extend pupils' understandings beyond first-hand experiences and to spark their imagination and curiosity. They can be used to stimulate an interest in a variety of resources and an appreciation and enjoyment of viewing and reading. The following are some of the materials that can be used for these purposes:
- pictures (e.g., magazine illustrations, photographs, commercial prints);
- models (e.g., of animals or people);
- books (fiction, non-fiction, poetry);
- magazine and newspaper articles;
- non-print media (e.g., TV programs, slides, audiotapes, films, overhead transparencies, videotapes, records);
- computers.

Physical activities should be planned to:
- promote large- and small-muscle co-ordination and strength;
- aid in the development of thinking and problem-solving skills;
- promote the development of small- and large-muscle control; and
- develop in children a willingness to try new learning activities.

The equipment provided for these purposes can include the following:
- manipulative materials (e.g., puzzles, pegboards and pegs, pounding sets, nesting games, beads, bead strings, carpentry and woodworking materials, wooden cubes, snap blocks, magnetic and wooden letters, pattern blocks, flannel boards and figures, typewriters);
- indoor equipment (e.g., jungle gyms, mats, tricycles, bicycles, walking boards, beanbags, balls, boxes, a variety of blocks, ropes, hammers and nails, hoops, scoops, child-sized furniture, rocking horses);
- outdoor equipment and terrains (e.g., varied land surfaces: grassy, flat, hilly, sandy; climbing apparatus; swings; slides; blocks; teeter-totters; sawhorses; flat boards; wheeled toys; hoops; balls).

Children should be given the time, opportunity, and encouragement to record their own ideas, feelings, and experiences, to expand their ability to express themselves creatively, to talk with the teacher and with their peers, to extend their understanding of the potential of a variety of materials, and to clarify their understanding of the world. The following materials can be used for these purposes:
- writing materials (e.g., crayons, felt pens, pencils, pens, paintbrushes; different types and sizes of paper: graph, coloured; models of numerals, letters, and symbols);
- construction materials (e.g., blocks, wood, nails, snap blocks, cardboard);
- technological materials (e.g., typewriters, computers, tape-recorders, video equipment);
- rhythm instruments (e.g., drums, cymbals, maracas, rhythm sticks, sand blocks, tambourines, triangles, bells);
- art materials (e.g., drawing materials: crayons, chalk, paper; modelling materials: clay, plasticine, play dough, bread dough, wet and dry sand, cartons; collage materials: paper, adhesives);
- dramatic materials (e.g., clothes; swatches of materials; signs; real objects: tools, keys, telephone books, flashlights, canteens, mirrors, towels, combs, scarves; doctor, nurse, and firefighter accessories; puppets).

Arranging space. The child's learning is facilitated when materials and equipment are organized for accessibility and flexibility of use. Together, the teacher and the children can plan the most convenient, efficient, and attractive use of space for a variety of activities. This can include both indoor and outdoor areas:
- whose purpose is clearly discernible to the child;
- that provide ready access to materials and tools;
- for the specific use of individual children;
- that allow for both individual and group activities;

- that allow for sufficient "looseness" and "messiness" to permit creativity;
- that can be altered by the children themselves;
- that can be used for relaxation as well as activities.

Organizing time. Children need the time and opportunities to make their own choices and decisions about activities, to become fully involved in the activities they have chosen, and to complete these activities. Children should not all be expected to do the same things at the same time. Thus, the scheduling of activities should be sufficiently flexible to:

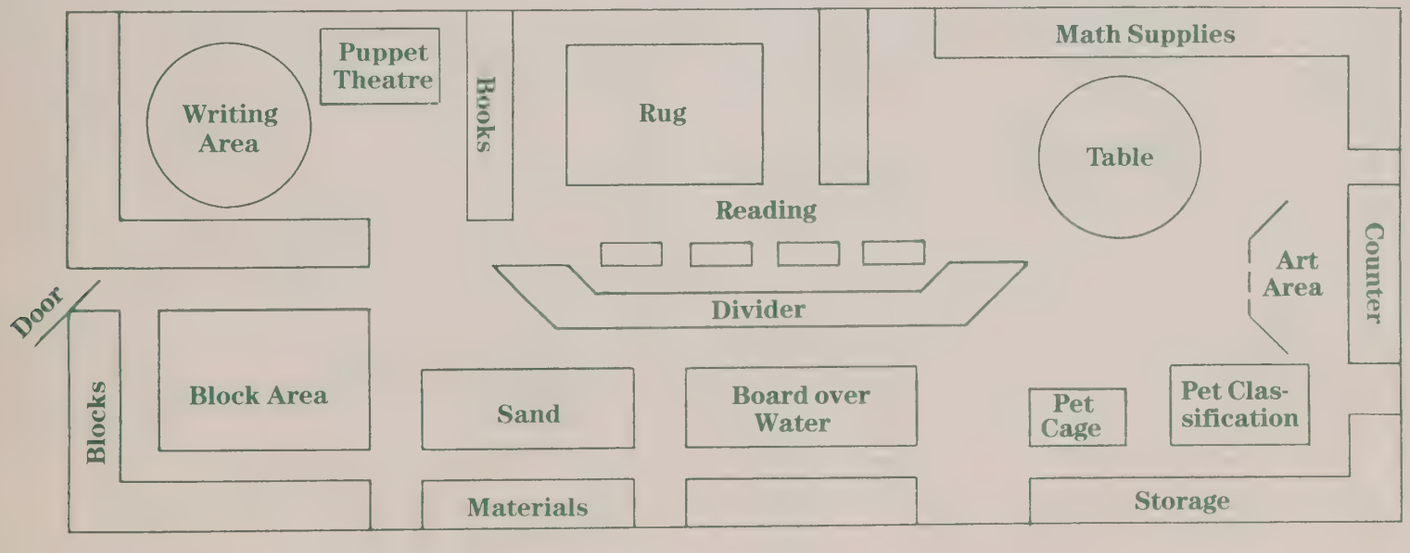
- allow for lengthy activities as well as brief ones (The solution of a problem may take moments, hours, or days.);
- allow individuals to become absorbed in activities; and
- accommodate the differences in the pace at which individuals learn.

Time should also be provided for children to take part in activities involving independent decision making and inquiry, undirected play, daydreaming, thinking, and polishing.

Involving others in the program. Children need opportunities to interact with a variety of people, who can act as sources of support, assistance, and information. There are many people who can become involved in interacting with children, either within the learning environment or in the community. These include:

- adults in the children's immediate environment (e.g., grandparents, parents, older schoolchildren, community helpers, bus drivers, custodians, volunteers);
- peers (e.g., members of the class and children from other classes);
- professionals (e.g., teachers, principals, nurses, social workers, support-service personnel, aides);
- resource personnel (e.g., artists, musicians, poets, community-service people).

The establishing of superior Primary learning environments requires a great deal of the teacher, but the results make the effort worthwhile. The following description of an exemplary classroom for older Primary children was provided by a Primary consultant who visited it. This classroom illustrates many of the suggestions made both in this section and in the previous one of shared-interest activities.



The whole class had visited the zoo the week before and had also viewed a film about zoo animals. Some groups of children and some individuals had chosen to follow up particular interests arising from the class experiences.

Back in the classroom, these children were totally absorbed in their investigations. Three children used blocks to make a model of the zoo, while a fourth child used a map of the zoo to check the construction for distance and direction.

Next to the block area, two children were studying a map of southern Ontario, on which they had outlined their bus trip to the zoo. They were trying to decide what they could use at the sand table to represent the landmarks they had seen along the route.

At the next table, two girls were modelling water animals for a display showing the environments of the animals. They had been looking at pictures and reading books that they had collected from the school library. They had recorded information on a chart, which they would later use to talk or write about the physical, behavioural, and environmental characteristics of water animals.

Characteristics of Water Animals

Water Animal	Physical Appearance	Behaviour	Environment
Beaver	flat tail thick fur	food—tree bark	ponds Canada
Hippopotamus	tough hide like a large pig	food—water plants	rivers Africa
Whale	large blow hole	food—plankton surfaces for air	ocean

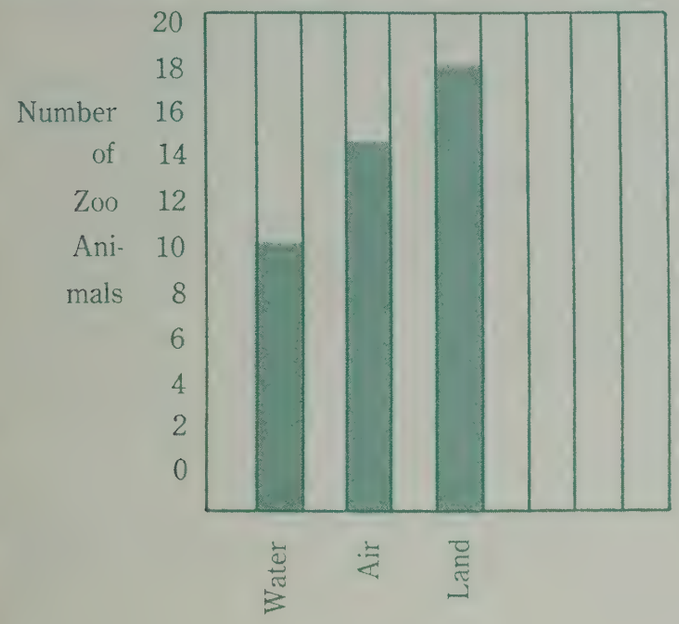
A cage on the floor contained a white rabbit. On the wall above it was a chart that indicated how the pet should be cared for and included the names of the four children involved. At the table next to the cage, pictures of pets had been sorted according to their method of locomotion. One child was writing the classification information on another chart, while the other three children and the teacher provided the ideas.

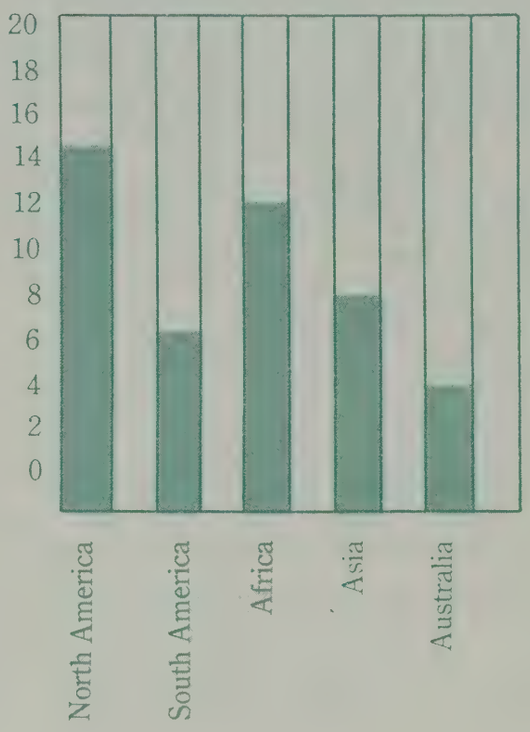
At the art centre a boy and a girl were painting, and another child was modelling with clay. Each child had read some information about a favourite zoo animal, which was now being painted or modelled. The information would later be written in individual reports. Each child had a chart that contained spaces filled with information. The information in each space would probably be expanded into a paragraph in the article that each child would later write.

Characteristics of a Zoo Animal

	Physical Appearance	Behaviour	Environment
Elephant	huge long trunk rope tail	usually slow moving uses trunk to lift and spray	Africa India

At the next corner table, there were many pictures and models of zoo animals. Two children were sorting the models and two others the pictures by using coloured shoelaces to make circles for organizers. Each group of children had a large sheet of squared paper on which they intended to make a graph of one of the ways in which they had classified. This would involve them in counting the number of objects in each set and making columns with the same number of squares to represent each value of the classification dimension. The teacher remained at this centre for a while to act as a consultant, as the children there were asking questions.





The room contained a storage cupboard that formed a divider. On one of its sides was an area for the teacher to work with a group of children. It contained a large rug, a chair, and an easel. Large or small groups of pupils gathered here whenever that type of grouping was necessary to facilitate the learning process.

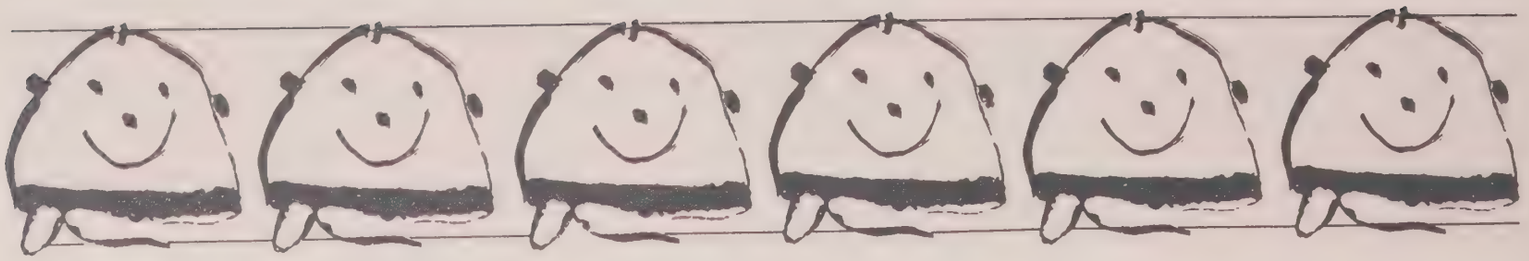
Both sides of the area on the other side of the divider were filled with library books. Books about zoo animals and pets had been placed in a special section on the side facing away from the teacher's area. Here, behind a low divider, three children were sitting reading on small mats.

Five children were at the writing centre. Two were preparing to write an article on zoo cats, using a chart on which they had collected information. The other three children had chosen to write creative stories about make-believe animals. Through a discussion, the teacher had helped them to choose a problem for each animal, various ways for it to solve its problem, and a final, surprise solution. The children intended to edit and publish their stories if they were satisfied with them.

A puppet stage, unused at the moment, stood by the wall.

Two mothers visited the class during the morning. Because of the classroom's open-door policy, they were able to observe the program and talk quietly both with their own children and with others.

When it was time for lunch, the children left their work neatly organized where they were working so that they would be able to continue working on their return. The children's classroom time was left flexible so that they always had the opportunity to follow through on their ideas. When appropriate, the whole class or small groups would be called together for presentations, consultations, music or physical activities, and so on.



Appendix: Sample Growth Strands

This appendix offers examples of growth strands related to the following areas of learning: inquiry strategies; reading; writing; thinking skills (observation, classification, seriation, and correspondence); social skills (working in a group). As research in child behaviour progresses, these growth strands may be refined, and others identified.

Inquiry Strategies

As the child begins to develop inquiry strategies, he/she can proceed along the following developmental stages. The child:

1. becomes curious about people, places, and things in the immediate environment;

2. spontaneously explores the immediate environment through self-directed activities involving all the senses;

3. conducts explorations using an intuitive problem-solving process (including the random use of the skills of observation, classification, seriation, and correspondence) stimulated by questions and makes simple relationships to form conclusions;

4. becomes aware of a general inquiry procedure as a strategy for exploring events, objects, and ideas;

5. uses a general inquiry procedure to explore topics of interest in a variety of learning experiences;

6. consciously uses thinking skills (observation, classification, seriation, correspondence) to develop concepts related to topics of interest;

7. relates concepts, using thinking skills to identify suitable inquiry questions for further investigation;

8. uses a general inquiry procedure and available resources to complete his/her investigation;

9. evaluates his/her results and uses an inquiry procedure with the teacher;

10. plans independent inquiry applications with the teacher's assistance.

Reading

Before a child begins to read, his/her speech reveals an intuitive sense of language structure and sequence. The child's ability to discuss ideas and events increases as the child develops. When the child begins to learn to read, he/she can proceed along the following stages in the development of reading skills. The child can:

1. hold a book and turn the pages, while "reading" silently or orally, using pictures and/or past experience with the story to supply meaning. The child may attempt to approximate the language and expression of the person who previously read or told him/her the story;

2. begin to match "reading" to some of the chunks of print in the reading materials (e.g., "I can . . .", "Here comes . . ");

3. begin to match "reading" to some individual words in the context, indicating that he/she is becoming aware of words as smaller chunks of print between white spaces. In doing this, the child may use a finger to point to the word being "read";

4. over time, read an expanding sight vocabulary as a result of many successful experiences with reading for meaning;

5. self-correct when encountering a passage that does not make sense to him/her. To do this, the child may (a) go back and rework the passage; or (b) read on to see whether additional cues to meaning are available;

6. substitute familiar words for unknown words encountered in print, in order to fully comprehend a passage. In doing this, the child may use synonyms (e.g., "stairs" for "steps"). He/she may also use parallel grammatical forms (e.g., the verb "followed" for the verb "chased"), showing an intuitive sense of language structure and sequence;

7. begin to think critically, becoming increasingly sensitive to reading material that is "out of tune" with his/her own particular perception of the world. For example, the child may say, "I don't think that is right" on reading that a mother animal does not love her children. The child may go along with the author's ideas, however, if the material is well written and involves fantasy or humour (e.g., a monster with two heads);

8. become increasingly sensitive to the idea that his/her reading must be congruent with the graphic representations and employ appropriate correction strategies to achieve this. The child may, for example, see print that says, "Mary loved her pet dog," but read "May loved her pet dog," and then, after looking more closely at the letters, read the sentence as it is written;

9. use three approaches to find meaning from print:
   a) semantics, which involves a consideration of the meaning of a passage;
   b) syntactics, based on the child's sense of language structure; and
   c) phonographics, involving the child's gradually more refined observations of graphic symbols.

For a child to be given opportunities to follow a natural approach to reading, the teacher must value:

1. the construction of meaning from print before accurate reading of each graphic symbol takes place (i.e., must put meaning before form);

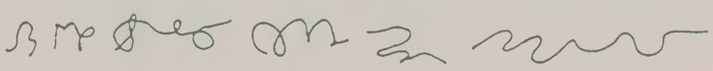
2. miscues as being natural and necessary to the developmental process of reading;

3. accuracy as a consequence of many successful experiences with the processing of print.

Writing

Before a child begins to write, his/her speech reveals an intuitive sense of language structure and sequence. The child's ability to discuss ideas and events increases as the child develops. When the child begins to learn to write, he/she can proceed along the following stages in the development of writing skills. The child can:

1. write scribbled symbols that may have meaning for him-/herself but are unidentifiable to the reader:



2. write a garbled mixture of scribbles with some symbols that are identifiable to the reader:

3. begin to write units meaningful to him/her, with some identifiable words:

I cum it hat git.

4. write meaningful units in which the reader can also identify meaning:

I go to a parte to Bds.

5. write a description, using spelling and printing that are close to standardized forms:

My dog is funy.
My dog eats dog food.
My dog hats cats.
My othr dog loves cats.

6. write a sequence of events in his/her early narrative writing:

My Dog
My dog is funny. He makes me laff. Yesterday he hid under my bed. He was serd. He wudn't come out.

7. a) retell a real or vicarious experience with a partial beginning, middle, and/or ending:

When I woke up at Sunday morning I said, "could I go out?" My mother said, "we are going to beach." I was glad and said, "could I go out?" My mother said yes. We went there at about 1:00. We had a good time!

b) retell a real or vicarious experience with a complete beginning, middle, and/or ending:

A Snowy Day
It snowd yesterday. May and Tom played with me. We made a snowman. Then the snowman fell ovr. We peashed it. Then it was strat and then we had to fix it. We put snow by the feet to hold it. The snowman looks good. We like the snowman.

8. a) create a story from his/her own ideas, with a partial beginning, middle, and ending:

The Strange Crow
Once there was a crow. This crow was very strainge. He lived in the dry, sandy desrt. One day the crow was very thrustay so he flew to the end of the desrt. He drank from the pond. He went to the dezard and went home.

b) create a story from his/her own ideas, with a complete beginning, middle, and ending:

The wiche
Once upon a time there was a small whiche who could fly. She could fly on a broom and she could fly high into the trees but she was lonly. Once day she saw lots of kids playing and she whent to ask "could I play a game" but the kids ran away. They were scired so she said "what can I do" so she went to a people store. She bout a kostume and she put it on and she looked just like a kid. She could not fly because she scird the kids so she walked to see them. Now the kids didn't get scird and they said — "sure". So they all played a game and the wiche was happy and she wasn't lonly.

9. use his/her own ideas to create an expository (explanatory) passage that develops a theme or problem and carries it through to a conclusion:

Musical Instrument
If I had a choice of any instrument, I would play the drums because I like a group called KISS and they have a guy called Peter Chris and he can really beat those skins. When I get older I want to take drumming lessons, I also like the drums because in war they used to use drums for some kind of parade. I realy like drums.

For a child to be given opportunities to follow a natural approach to writing, the teacher must value:

1. the construction of meaning through the use of graphic symbols (meaning before form);

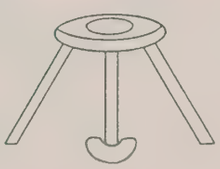
2. non-standard spelling and letter forms as being natural and necessary to the developmental process of writing;

3. accuracy as a consequence of many successful experiences with expressing ideas through print.

Thinking Skills

Observation Skills

The following is the growth strand in the child's development of observation skills.

Skills	Examples
The child can: 1. observe and express the most obvious characteristics of objects and/or actions;	 The child makes the following observations: round, red, small
2. observe and express the less obvious characteristics of objects and/or actions;	 flat side, black spot, smooth, has a smell
3. observe and express several characteristics of objects and/or actions;	 small, smooth, red and yellow, round with a flat side, stem, odour
4. observe and express the "hidden characteristics" of objects and/or actions by acting on them without the aid of measuring or observation devices;	 An apple, when cut, has seeds and maybe a worm to see; when pushed, may roll; and when bitten into, may taste sweet.
5. observe objects and/or actions and express characteristics not readily available to the senses by using measuring or observation devices;	 a) When a tripod lens is used to look at the inside of an apple, we can see an uneven surface. b) When a scale is used to weigh an apple, its mass is 18 g.
6. preplan observations of objects and/or actions.	 When the pupil picks out a pumpkin, he/she may say, "I want to look at my pumpkin, smell it, cut it open, taste it, weigh it, and look at the seeds with a lens."

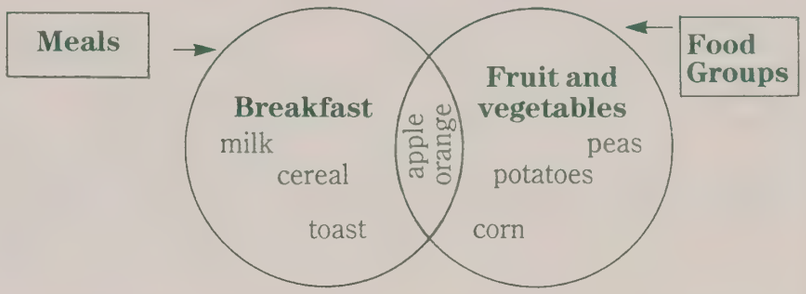
Classification Skills

The following is the growth strand in the child's development of classification skills.

Skills	Examples
The child can:	The child classifies objects as follows:
1. pull some items out of a collection according to one value, leaving others in the collection (consistent classification);	**Foods** → **Meats**
2. classify everything in a collection according to one dimension (exhaustive classification);	**Food Groups**: **Foods** → Fruits and vegetables; Milk and milk products; Bread and cereals; Meats
3. arrange and rearrange the items in a collection according to different dimensions (horizontal reclassification);	**Food Groups**: a) **Foods** → Fruits and vegetables; Milk and milk products; Bread and cereals; Meats. b) **Primary Food Sources** → Plants; Animals

Skills	Examples

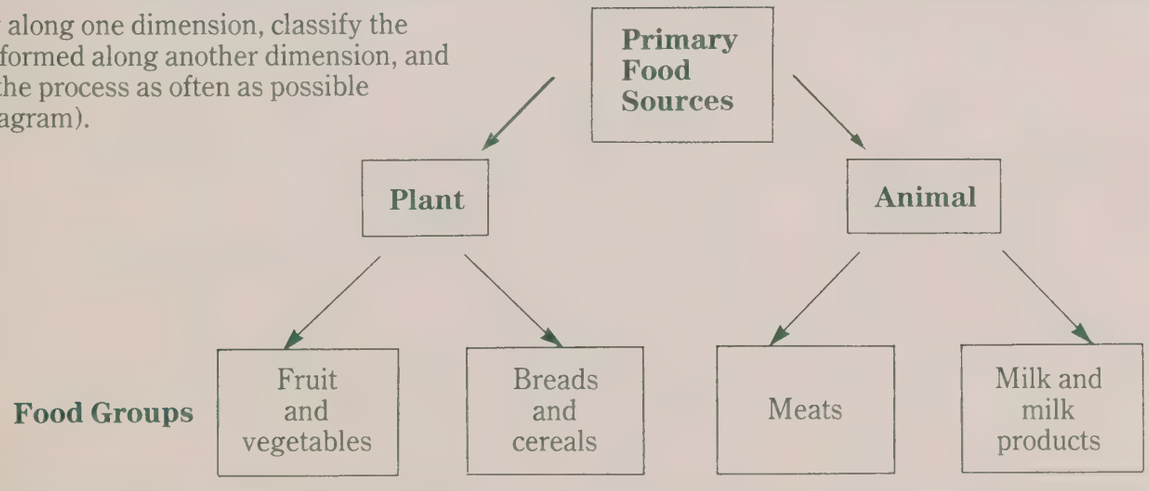
4. classify along two dimensions at the same time, using one value of each dimension, and indicate which items belong to both sets (set intersection);



5. classify along two dimensions at the same time, using several values of each dimension (cross-classification);

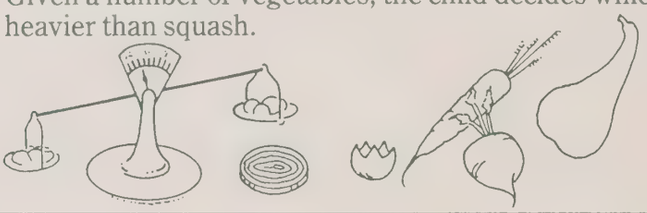
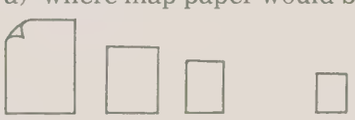
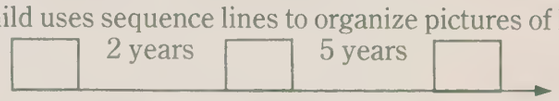
Foods	Meals		
	Breakfast	Lunch	Dinner
Fruits and vegetables			
Milk and milk products			
Breads and cereals			
Meats			

6. classify along one dimension, classify the groups formed along another dimension, and repeat the process as often as possible (tree diagram).



Seriation Skills

The following is the growth strand in the child's development of seriation skills.

Skills	Examples
The child can: 1. compare two elements and indicate which one exceeds the other along some dimension;	The child decides that the bell on the wall rings louder than the bell on the desk. 
2. given a set of elements, select one that exceeds a particular one along some dimension;	Given a number of vegetables, the child decides which vegetable is heavier than squash. 
3. arrange three or more elements in a series;	After pouring water from three containers into a fourth, the child can place the three containers in a series according to the volume of water each can hold. 
4. place an element into a given series of three or more elements: a) at either end; b) between elements;	The child decides: a) where map paper would be placed in a series according to height;  b) where a particular block would be placed in a series according to height. 
5. given a group of objects, seriate them along one dimension and then reseriate them along another dimension;	The child seriates fruit according to texture of skin and then according to sweetness of taste. 
6. represent a serial relationship by a diagram.	The child uses sequence lines to organize pictures of his/her life. Baby 2 years 5 years  The child, working in a group, graphs in order the waist measurements of four children. 

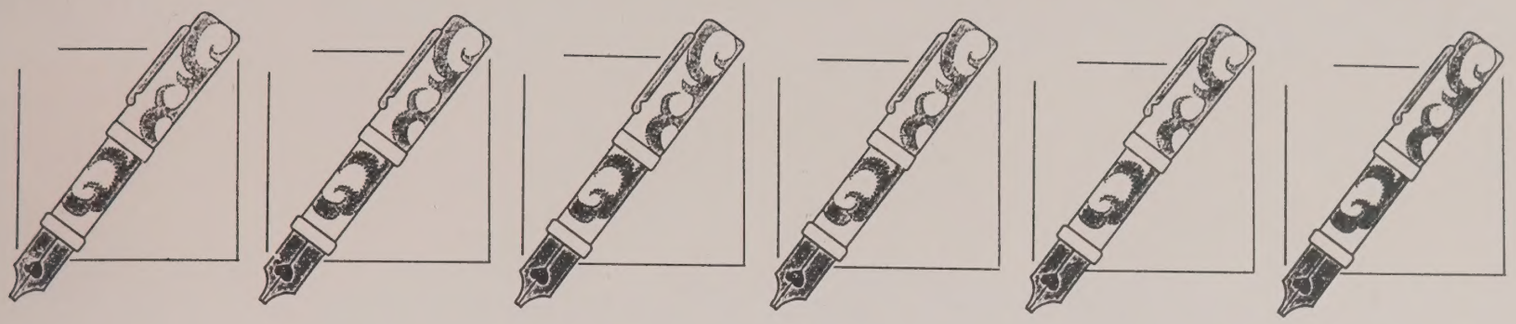
Correspondence Skills

The following is the growth strand in the child's development of correspondence skills.

Skills	Examples
The child will: 1. match items one to one;	At snack time the child gives one snack to each student. 
2. construct an equivalent set through one-to-one matching;	The child makes a plasticine model to represent each object on the JK playground (e.g., geodesic dome, tree, bush). 
3. determine whether two sets are equivalent by one-to-one matching;	The child matches one car to each space in the toy parking lot to determine whether there are enough spaces for all the cars. 
4. construct proportional sets through one-to-many or many-to-one correspondence;	The child matches cardboard trees to each cardboard house on a model. 
5. determine whether two sets are proportional by one-to-many or many-to-one matching;	The child determines whether there are enough paste bottles so that each pair of children may have one. 
6. apply correspondence to many-to-many situations.	The child determines that each group of three children will need five boxes of plasticine to make a model. 

Social Skills (Working in a Group)

Skills	Examples
The program will provide the child with opportunities to:	
1. take and perform various roles within a group (e.g., as a leader or a follower, as the situation requires);	In a group of three children who are classifying materials, one child is assigned the leadership role by the teacher. That child makes a chart of the classification while the other two children give input as to the contents of the chart. (At another time children may be given the opportunity to choose their own leader.)
2. perceive and express what his/her fair share of the work in a group would be;	A group of two children decides to make a model of the school parking lot. The teacher asks them to plan what each one would do to complete the task. When the children have planned what each will do, the teacher asks them to determine if their plan is fair.
3. make a relevant contribution to a discussion;	Immediately following a teacher-led, small-group discussion about safety in the classroom, the teacher asks the children to think about whether they contributed to the discussion and whether their contribution added anything to the topic being discussed.
4. listen to, think about, and express the contributions of others;	The class discusses, in groups of two, the interests of family members, with one child telling the other the interests of the members of his/her family. The two groups then combine, and the listener in each group tells the other group what the speaker said. (Children take turns being listeners and speakers.)
5. encourage others in a group to contribute to a discussion;	During a discussion about the benefits of various recreational activities to fitness, children are asked to state an opinion and then ask one other child to respond to the opinion (e.g., Joe might say, "Bowling is the best sport for fitness because it's so much fun. What do you think, Jennie?").
6. begin to manage conflict effectively;	In working out a plan for making a model, two children disagree about the share of the work they are going to do and begin shouting at one another. The teacher intervenes to explore with the students the consequences of their actions and encourages them to suggest alternative ways to settle the conflict.
7. determine when a situation requires individual work and express this.	The teacher talks to a group of three children who are making a mural about which tasks are best done by a group and which by individuals. The children may choose in this case that: a) the group decide what to put into the mural; b) the group decide how to divide up the mural; c) individuals work on their own sections of the mural.



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